NOTES ON THE MAMMALS AND REPTILES OF PEARSON, DOROTHEE AND GREENLY ISLANDS, SOUTH AUSTRALIA

by A. C. ROBINSON*

Summary

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Collections and observations of the mammals and reptiles of Pearson, Dorothee and Greenly Islands off the west coast of Eyre Peninsula were made in November 1975 and 1976. Southern Bush Rats on Pearson Island are smaller, breed earlier and occur at a lower population density than on Greenly Island. The difference in population density may be explained by the different stages in the reproductive cycle on the two islands in November. Population estimates of the Pearson Island Rock Wallaby and the introduced population of Tammar Wallabies on Greenly Island are given. An annotated list of all reptiles recorded from the islands is given.

Introduction

In November 1976, a biological survey of Pearson Island and Dorothee Island (Investigator Group) and Greenly Island was undertaken by A. C. Robinson, T. J. Fatchen, A. Spiers and J. B. Cox (South Australian National Parks and Wildlife Service) and S. A. Parker and W. Zeidler (South Australian Museum).

Pearson Island is located at 34°4'S, 134° 17'E, Dorothee Island at 34°0'S, 134°15'E and Greenly Island at 34°39'S, 134°45'E. Four days and nights were spent on Pearson Island, a day and a night on Dorothee Island and four days and nights on Greenly Island. In November 1975 a two day trip to Pearson Island was made and some small mammal trapping and observation of the rock wallaby population was carried out.

This paper presents observations made on the mammals and reptiles of these islands. The birds are discussed in Parker & Cox (1978) while the vegetation will be examined in Fatchen (in prep.). Previous observations (summarised here) are available from expeditions to Pearson Island in 1914, 1922, 1923 (Proctor 1923, Wood-Jones 1922, 1923, 1924), 1960, 1968, 1969 (Thomas & Delroy 1971) 1969 (Smyth 1971), 1973 (Gepp 1973[1]), 1974 (Schmitt 1975) and Field Naturalists' Society Mammal Club unpublished observation, from Dorothee Island in 1969 (Smyth 1971); and from Greenly Island in 1947 (Finlayson 1948a, b; Mitchell & Behrndt 1949).

The three islands are all essentially granite based islands with very little of their original limestone capping remaining, the geomorphology of Pearson and Dorothee Islands having been described by Twidale (1971). Mitchell & Behrndt (1949) gave a general description of Greenly Island, while the geology of the Greenly Island basement rock is described by Webb & Thomson (1977).

The vegetation of the three islands is similar, that of Pearson and Dorothee Islands being described by Osborn (1923), Specht (1969) and Symon (1971) while that of Greenly was described by Finlayson (1948. a, b), Mitchell & Behrndt (1949) and Cleland (1950).

In addition to the general biological survey carried out on the islands an attempt was made to determine the effect of fire on the flora and fauna. An extensive area on the southern part of the main Pearson Island was burnt in a fire which is believed to have started from a lightning strike on the island peak in early April, 1975 (D. Steen pers. comm.). This fire must have been extremely hot, and total destruction of the above ground parts of the vegetation has occurred over large areas. The extent of the fire is shown in Fig. 1.

On Greenly Island a number of fires were lit by tuna fishermen on 6 February, 1974. The areas burnt are shown on Fig. 2 from unpublished records of the fire, prepared by members of the N.P.&W.S. who visited the island on 24 February, 1974.

* National Parks & Wildlife Service, Box 1782, G.P.O., Adelaide, South Australia 5001.

[1] Gepp, B. (1973) The Social Organisation of the Pearson Island Rock Wallaby (*Petrogale penicillata pearsoni*). B.Sc. Hons. thesis, Zoology Department, University of Adelaide.

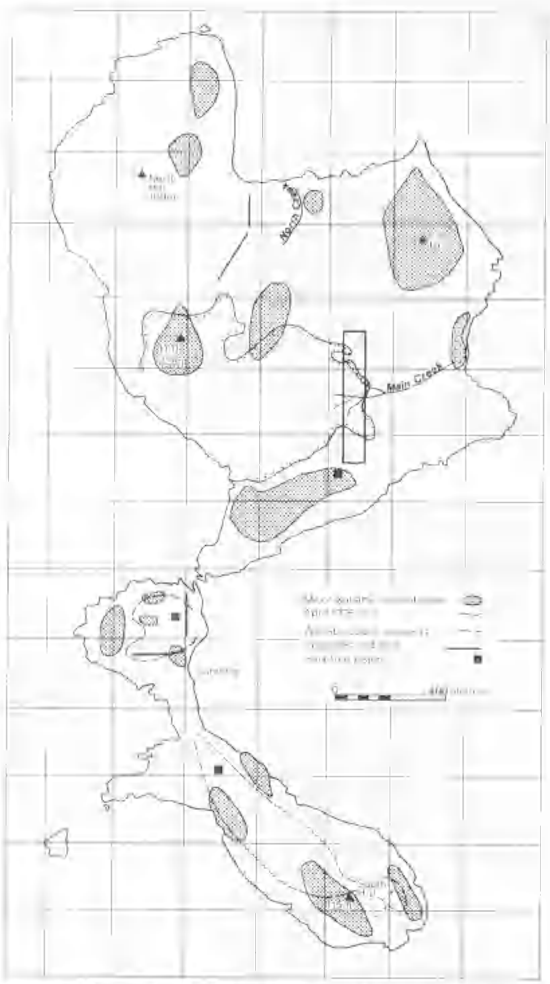

Fig. 1. Pearson Island showing location of trapping areas, transect counts and wallaby populations.

Methods

An arbitrary grid system with 250 m grid intervals was established over the three islands to be sampled (Figs 1, 2). Collecting and observation efforts sampled as many of the grid intersections as possible to obtain good coverage of the range of habitats on the islands. Line transects at night using a spotlight were walked on both central and south Pearson, and during the day on Greenly Island to try and estimate the wallaby populations. Small mammals were sampled by systematic trapping using Elliot and Sherman aluminium box traps set either on a grid pattern or in lines. All *Rattus fuscipes* trapped were weighed and individually marked by toe clipping. The reproductive condition noted by recording if testes were descended or undescended in males and if vaginae were perforate or imperforate and if nipples were enlarged by suckling in females.

(a) *Pearson Island*: On 2 November, 1975, two traplines were set above the northern bay (Fig. 1). Each had 10 sites at 20 m intervals with three traps per site. On 24–25 November, 1976, two traplines were set on the centre section (Fig. 1). Each had 12 sites at 20 m intervals with two traps per site. At the same time a grid was established on the main island with 80 sites at 25 m intervals and two traps per site. This grid was positioned to sample as wide a range of vegetation as possible from the low *Atriplex* shrubland near the coast through the closed *Melaleuca halmaturorum* scrub along the creek and into the low *Casuarina* woodland on the slopes of the island peak. In addition the grid sampled as equally as possible areas burnt in the 1975 fire and unburnt areas. There were 34 sites in the burnt area and 46 unburnt sites.

(b) *Dorothee Island*: On 27 November, 1976, two traplines were set in a WNW and SE direction from the conservation park sign on the central eastern shore. Each had 20 sites at 20 m intervals with two traps per site.

(c) *Greenly Island*: On 29–30 November, 1976, a trapline was set above the anchorage (Fig. 2.). It had 12 sites at 20 m intervals with two traps per site, and a grid was established on the northern slopes of the main island (Fig. 3) with 48 sites at 25 m intervals and two traps per site. This grid was positioned to sample as wide a range of vegetation as possible from the *Poa* tussock grassland on the lower slopes to the low *Casuarina* woodland on the upper parts of the island. The grid sampled areas of grassland burnt in the 1974 fires. It was not possible to distinguish boundaries between burnt and and unburnt sites due to the degree of regeneration.

All species of mammals and reptiles recorded from the islands are discussed. South Australian Museum registration numbers are recorded of specimens collected.

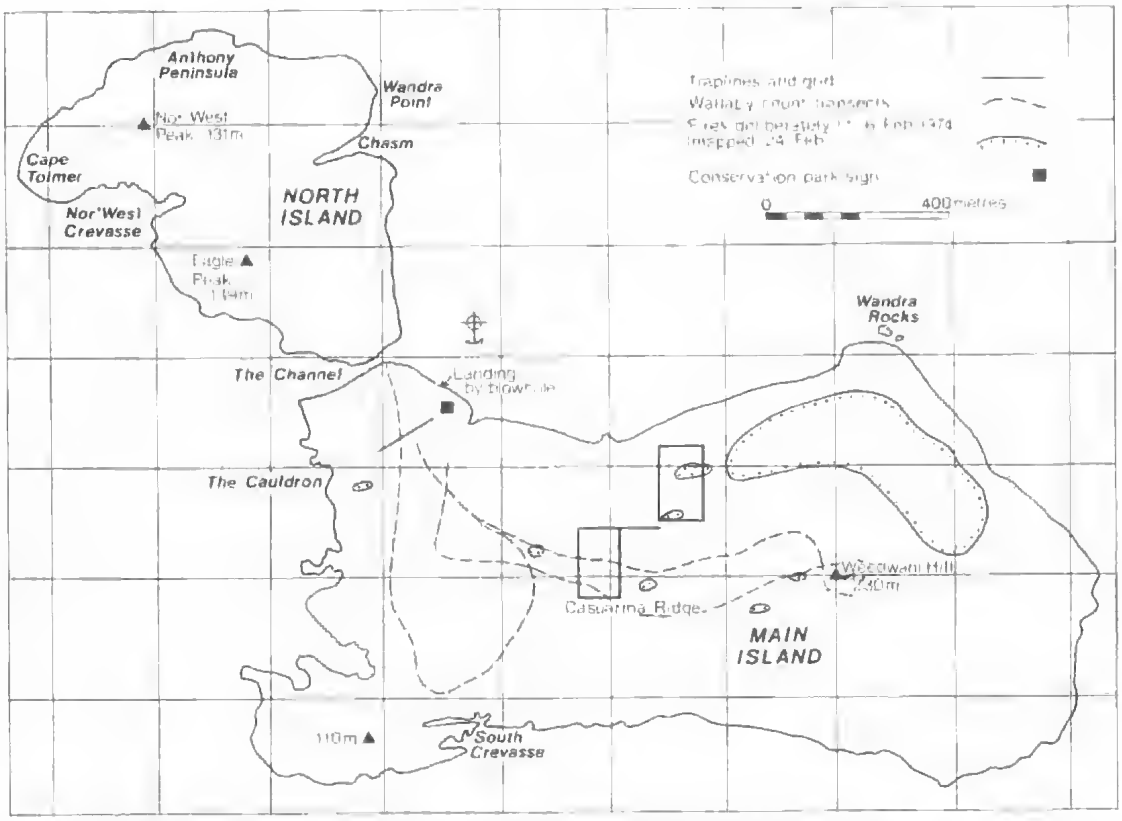

Figure 2. Greenly Island showing location of trapping areas and wallaby count transects.

Results

MAMMALS

Family MACROPODIDAE

Petrogale lateralis Gould. Pearson Island Rock Wallaby. This species was collected in 1920 by Wood Jones from Pearson Island and Thomas (1922) described it as a new species (*P. pearsoni*). Since then there has been considerable confusion about its relationship with other rock wallabies and this is discussed by Thomas & Delroy (1971). Recent chromosome and electrophoretic studies (G. Sharman pers. comm.), place the Pearson Island animals with western and central Australian populations of *P. lateralis* (Poole, 1979). *P. lateralis* also occurred in the far north-west of the South Australian mainland but may now be extinct. Early visitors to Pearson Island mentioned that the rock wallabies occurred only on the northern section (Wood Jones 1923). This section is separated from the central and southern section by a sand spit that dries at low tide. The 1960 expedition also noted the absence of wallabies on the middle and south sections of the island and they found no trace of skeletons or of occupation of several caves on the southern section. On the 1960 expedition several wallabies were caught on the northern section and transferred to a camp on the middle section. Four females, one male and one animal of unknown sex escaped. It appears certain that the present rock wallaby population on the middle and southern sections of Pearson Island is descended from these six escapees.

Thomas & Delroy (1971) estimated that there were 50–150 wallabies on the middle and southern sections in 1968 and showed that this 1960–1968 population increase was theoretically possible from the original six animals. In 1976, transect counts of the middle section in the evening (24 November) and at night by spotlight (25 November) revealed 64 and 40 individuals respectively, while a spotlight transect on the southern section (25 November) revealed 92 individuals. Thus the total population of the middle and southern sections is at least 150. The distribution of this population is shown in Fig. 1.

It is much more difficult to estimate the wallaby population on the northern section of Pearson Island. The population is fragmented (Fig. 1) being confined to areas with suitable rock crevices and caves and the dense vegetation makes sighting difficult. Thomas & Delroy (1971) provide two estimates for the northern section: 1960—500 to 600 and 1968 in excess of 500. In November 1975, the author walked over the whole of the northern section and counted 132 individuals: this was undoubtedly too low and the total population is probably twice this size between 250 and 300. No estimates of the population on the northern section were attemped in 1976.

The diet of the wallabies was observed to include *Lepidium foliosum*, *Atriplex cinerea*, *A. paludosa*, *Rhagodia baccata*, *Enchylaena tomentosa*, *Olearia ramulosa*, *Carpobrotus rossii* and *Disphyma australe*. On the northern section, even around the major colonies of wallabies there was little evidence of grazing of the vegetation. On the middle and southern sections however, large areas of vegetation were obviously very heavily grazed. This was particularly the case with *E. tomentosa*, while *D. australe* and *A. paludosa* were also being affected.

Macropus eugenii (Desmarest) Tammar, SAM, M9786. An unknown number of Tammars were introduced to Greenly Island from Kangaroo Island in about 1905 to act as an emergency food supply for possible castaways (Mitchell & Behrndt 1949). They now occur on both the main central and small south-western section of the island but are apparently absent from the northern section. They spend the daytime in the dense teatree thickets on the south side of the main ridge of the island and also occupy some of the gullies on the northern slopes of the island. They are extremely difficult to observe and the two transect counts (Fig. 2) resulted in the sighting of four and 14 individuals. It is probable that the total population is about 50 individuals.

The stability of the Tammar population on Greenly Island is not known, but a comparison of the vegetation of the main island with the northern section where wallabies are absent reveals that they have had a substantial impact on the island vegetation. There has been significant reductions in both species diversity and ground cover and it appears that the present vegetation of the main section of Greenly Island is a direct result of severe over-grazing by the introduced Tammar population over the last 70 years.

Family Muridae

Rattus fuscipes (Waterhouse). Southern Bush Rat SAM M9787–91. This species is common on both Greenly and Pearson Islands but appears absent from Dorothee Island. The populations on both islands were probably derived from a population distributed across most of Southern Australia during the last ice age when both the islands were connected to the mainland. Schmitt (1978) and Schmitt & White (1979) have estimated that Pearson and Greenly Islands have been isolated from the mainland for 14 000 years. They have emphasised the importance of genetic drift in producing the differences between the island populations that they studied. The grid trapping carried out on this expedition provides an opportunity to obtain additional comparative data. Accordingly, the two islands are discussed separately below.

Pearson Island

Schmitt (1975) has demonstrated that significant genetic differences occur between the Bush Rat populations on the northern and southern sections of the island. The grid was located on the northern section (Fig. 1) and the following discussion refers to this population only.

(a) *Population density*: Twenty-six individuals were captured on the 50 000 m² of the grid. Therefore, ignoring boundary effects, the overall density was 5.2 rats/ha.

As approximately half the grid was in the area burnt by the 1975 fire it is appropriate to examine the differences in population density in the burnt and unburnt areas: Burnt sites 3.8 rats/ha; unburnt sites 6.3 rats/ha.

(b) *Sex ratio* 13 ♂♂ : 13 ♀♀

(c) *Body weight*: ♂♂ 40.4 g (30–55, n = 13); ♀♀ 49.1 g (30–70, n = 13)

(d) *Reproductive status*: All the males captured were sub-adult with undescended testes. Five of the females still had imperforate vaginas while those with perforate vaginae showed no indication that their nipples had been suckled. This suggests that there had been a spring breeding season with a very high mortality of

both male and female adults to result in this largely immature population in November.

Greenly Island

Although the part of the island covered by the trapping grid had been burnt in 1974, it was impossible to distinguish burnt and unburnt areas, so the whole grid was treated as a single area.

(a) *Population density*: Thirty-seven individuals were captured on the 30 000 m² of the grid. Therefore, ignoring boundary effects the overall density was 13.3 rats/ha.

(b) *Sex ratio*: 18 ♂♂ : 19 ♀♀

(c) *Body weight*: ♂♂ 83.8 g (35–130, n = 18); ♀♀ 70.7 g (40–100, n = 19)

(d) *Reproductive status*: Seven of the males were sub-adult but although all the remaining males were of adult weight, only two still had descended testes. Of the females three still had imperforate vaginae while four of those with perforate vaginae had developed nipples, indicating a recent cessation of the feeding of the young. This suggests that the breeding season had just ended and that at this stage in the population cycle there had been a high survival of both males and females from the parental generation.

A comparison of the Bush Rat populations of Pearson and Greenly Island indicates that the Greenly Island population occurs at a significantly higher density, even considering the population density on the unburnt portion of the Pearson Island grid. In addition the Greenly Island animals were much heavier and larger than the Pearson Island animals. Finally it appears that at least in 1976 there was a spring breeding season with a possibility of breeding continuing into early November on Greenly Island.

Additional comparative data on Bush Rat population densities on South Australian offshore islands are shown in Table 1. The figures are given as trapping percentages and with the exception of this present study are based on trap lines rather than grid trapping so no absolute densities can be obtained.

The differences in population densities between Pearson and Greenly Islands shown by the grid studies are also apparent in the line trapping. Schmitt's line trapping figures obtained in February and March however showed similar trapping success rates on both islands and it is possible that the differences demonstrated in the grid study in November may be due simply to greater survival of adults from the breeding season on Greenly Island than on Pearson Island. The high trapping success on other South Australian offshore islands indicates that high population densities of Bush Rats are a feature common to all of these islands.

Family OTARIIDAE

Neophoca cinerea (Peron & Lesueur) Australian Sealion. This species was present on each of the islands visited.

Pearson Island: 20–30 individuals, 4–6 mature bulls, the major concentration was on the beach on the centre section of the island.

TABLE 1. *Comparison of results of trapping studies of* Rattus fuscipes *on South Australian offshore islands*

Island	Month	Type of Trapping	Trapping Success %	Source
North Pearson I.	Nov	line	5	This Study
North Pearson I.	Feb	line	40	Schmitt (pers. comm.)
North Pearson I.	Nov	grid	8	This Study
South Pearson I.	Feb	line	27	Schmitt (pers. comm.)
South Pearson I.	Nov	line	19	This Study
Greenly I.	Mar	line	22	Schmitt (pers. comm).
Greenly I.	Nov	line	50	This Study
Greenly I.	Nov	grid	21	This Study
Waldegrave I.	Feb	line	68	Schmitt (pers. comm.)
Williams I.	Apr	line	82	Schmitt (pers. comm.)
North Gambier I.	Apr	line	52	Schmitt (pers. comm.)
Dog I.	Jun	line	73	Schmitt (pers. comm.)
Goat I.	Jun	line	62	Schmitt (pers. comm.)

Dorothee Island: 30 individuals, 7 mature bulls, the major concentration was on a sloping rock shelf on the north side of the central crevasse and on the saltbush covered slopes around a wallowing area.

Greenly Island: 30 individuals, 4 mature bulls, the major concentration was on a sloping granite shelf on the north face of the main island.

On all islands there were immature animals 1.5–2 m long associated with females, and some were observed to be suckling although they were often abandoned by their mothers on the higher parts of the island.

Arctocephalus forsteri (Lesson). New Zealand Fur Seal. This species was found only on Dorothee and Greenly Islands.

Dorothee Island: 16 individuals, 1 mature bull, concentrated in cracks and holes in the rock around the central crevasse.

Greenly Island: 40 individuals, 4 mature bulls with the major concentration on the sloping granite shelf on the north face of the main island near the blowhole. There was another small group in the south crevasse.

On both islands there were some immature animals 1–1.5 m long still associated with their mothers.

REPTILES

Family Gekkonidae

Phyllodactylus marmoratus (Gray). Marbled Gecko SAM, R15800A–D, R15802, A, B, R15807 A–D, R15809, R15815 A, B. Previously reported by Proctor (1923), Mitchell & Behrndt (1949) and Smyth (1971). Found on all three islands. Common in areas of limestone capping but also under exfoliating slabs of granite. Two clutches of eggs found on Pearson Island under a large slab of granite contained 14 and six eggs respectively. As this species lays only two eggs at a time it would appear that communal laying occurred at favoured sites.

Underwoodisaurus millii (Borg). Although not recorded in his paper, Smyth deposited specimens of this species from Pearson Island in the S.A. Museum. (R10237 A–B).

Family Pygopodidae

Aprasia striolata (Lutken). Although not recorded in his paper, Smyth deposited a specimen of this species from Pearson Island in the S.A. Museum. (R10232).

Family Agamidae

Amphibolurus fionni Proctor. Peninsula Dragon SAM R15801, R15803–6, R15820 A–B. Only found on Pearson and Dorothee Islands and previously reported by Proctor (1923) and Smyth (1971). Closely associated with granite out-crops. Further details of its offshore island distribution are discussed by Houston (1974).

Family Scincidae

Egernia multiscutata Mitchell & Behrndt SAM R15182 A–B, R15813 A–B, R15814. Recorded only from Greenly Island (Mitchell & Behrndt 1949). It was recorded only from Greenly Island on this occasion and found to be abundant in the *Casuarina* woodland, living in burrows beneath fallen logs and rocks. Also trapped in the *Poa* grassland but appeared much less common in this habitat.

Hemiergis peronii (Fitzinger) SAM R15808 A–C, R15810 A–B, R15811 A–B, R15816 A, B. Found on all three islands, previously reported by Proctor (1923), Mitchell & Behrndt (1949) and Smyth (1971). It was common in loose soil and accumulated organic matter at the base of plants and under rocks and fallen timber.

Leiolopisma entrecasteauxii (Duméril & Bibron). A single specimen was collected from Pearson Island in 1923 (Proctor 1923). It has not been collected there since.

Lerista frosti (Zietz). Not found by the present expedition but reported to be common on Pearson and Dorothee Island (Smyth 1971), while a single specimen (recorded as *Rhodona tetradactyla*) was taken from the peak of the main section of Greenly Island (Mitchell & Behrndt 1949).

Lerista picturata (Fry). Although not recorded in his paper, Smyth deposited a specimen of this species from Pearson Island in the S.A. Museum (R10235).

Menetia greyii (Gray). Recorded on Greenly Island by Mitchell & Behrndt (1949) but not seen or collected in 1976.

Morethia obscura (Storr). SAM R15819. Small fast moving skinks probably of this species were seen on Greenly Island and one specimen was collected from Pearson Island. It has been recorded from Pearson (Smyth 1971) and Greenly Islands (Mitchell & Behrndt 1949), as *M. lineoocellata*, but not from Dorothee Island.

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CATALOGUE OF PLEISTOCENE VERTEBRATE FOSSILS AND SITES IN SOUTH AUSTRALIA

BY D. L. G. WILLIAMS

Summary

The Pleistocene vertebrate fossil sites of South Australia are listed, summarising fossil assemblages and depositional environments. References to the literature are provided. A list of SAM specimens is available.